

SCIENTIFIC RESULTS OF EXPLORATIONS BY THE U. S. FISH
COMMISSION STEAMER ALBATROSS.

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No. XX.—ON SOME NEW OR INTERESTING WEST AMERICAN SHELLS
OBTAINED FROM THE DREDGINGS OF THE U. S. FISH COMMISSION
STEAMER ALBATROSS IN 1888, AND FROM OTHER SOURCES.

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(With Plates V-VII.)

Among the dredgings of the *Albatross* and other West American shells received during the last few years several forms of unusual interest have turned up, and it was thought desirable to have them described and illustrated for the use of students and collectors of the mollusks of this fauna. Some old species which have never been figured, or have been imperfectly figured, are here illustrated.

The confusion which has attended the history of some of them has been more or less successfully cleared up and distinctive features pointed out. In the absence of a complete monograph of West American species, less pretentious contributions to the knowledge of the fauna will help students to a better understanding of it, and thus advance the science and the prospect of a more comprehensive work. I have been much indebted to the kind coöperation of Mr. J. J. Rivers, of the University of California, Miss Ida M. Shepard, of Long Beach, and Mrs. M. Burton Williamson, of University, California, as well as several other ladies mentioned in the text.

Genus **EUPLEURA** Adams.

The species of this genus have been in a good deal of confusion, which I have endeavored to clear up in my contributions to the Tertiary Fauna of Florida (Transactions of the Wagner Free Institute of Science, Philadelphia, vol. III, p. 144, 1890). Numerous specimens of the Pacific form were dredged by the *Albatross* off the coast of Lower California near Cerros Island. I have thought it desirable to figure the various forms from typical examples in order to clear up the confusion.

Eupleura muriciformis Broderip.

(Plate v, Fig. 2.)

Ranella muriciformis Brod., P. Z. S., 1832, p. 179; Reeve, Conch. Icon. *Ranella*, Fig. 34.*Ranella plicata* Reeve, P. Z. S., 1844, p. 138; Conch. Icon., Fig. 33.*Ranella triquetra* Reeve, *op. cit.*, p. 139; Conch. Icon., Fig. 41, 1844.*Eupleura muriciformis* Dall, Trans. Wagner Inst. Sci., III, p. 145, 1890.

HABITAT: Montija Bay, West Columbia, Cuming *vide* Broderip; San Diego, Nuttall, *vide* Reeve; off Cerros Island, Lower California, in 10 to 16 fathoms; U. S. Fish Commission.

This species is found living in the Pacific waters from Venezuela to California and fossil in the Postpliocene of much of the same region.

E. triquetra Reeve is a large specimen with an unfinished lip; *E. plicata* of the same author is evidently a specimen of the same form with the canal shortened by mutilation.

I have seen no connecting links with *E. pectinata* Hinds, though they may exist. *E. nitida* Broderip is an entirely distinct species.

There are three varieties in the recent material belonging to this species which I have examined. The adult typical *muriciformis* has the following characters:

On the last whorl there are three strong knobs between the varices on each side; there is a thin, webbed varix with six primary spines, all recurved and deeply grooved in front; within the aperture there is a dentiform callus on the outer lip between every pair of spines and one on each side of the sutural commissure; the spine at the shoulder is much the longest, but the second spine, counting forward, is the one corresponding to the axis of the intervarical nodes; the web between the shoulder spine and the suture is bent forward; the spirals corresponding to the spines are very coarse, but not much elevated, and become stronger anteriorly as the spines diminish in strength and length.

The shell averages 37.4 millimetres in length, 23.5 millimetres in breadth, with a lesser diameter of about 12.2 millimetres.

Eupleura (var ?) *unispinosa* Dall.

(Plate VI, Fig. 5.)

Eupleura muriciformis Brod., var. *unispinosa* Dall, Trans. Wagn. Inst., III, p. 146, 1890.

This variety was collected by Rich at Mazatlan. It has a thick varix, hardly webbed, with only one short, recurved spine, which is at the shoulder; a much recurved canal; a subtriangular section; and, owing to the absence of webbing and spines, appears especially slender. This is the form which in my report on the Blake Gastropods (A, p. 203) was contrasted with the typical *E. caudata*.

The specimen figured has a total length of 33.3 millimetres, a maximum breadth of 16, and a sectional lesser diameter of 13 millimetres. This form is quite thick compared with the type and perhaps should be regarded as a distinct species, but these forms are so variable that I hesitate to separate them.

Eupleura, var. *limata* Dall.

Eupleura muriciformis Brod., var. *limata* Dall, *op. cit.*, p. 146, 1890.

At the head of the Gulf of California, near the estuary of the Colorado River, is found, both recent and in the Postpliocene of the vicinity, a variety which I have called *limata*, in which the intervarical nodes are obsolete; the whole surface nearly smooth; there are but two or three varices in all, and they are narrow and not prominent. This variety reaches a length of 40 and a width of 18.5 millimetres.

The depauperate character of this variety is very probably due to the freshening of the water by the outflow from the river and the barren sandy shore upon which it lives. I have shown elsewhere in connection with *Melongena* that the rocky oyster reefs furnish the rough and the sandy shores the smoother specimens and this generalization probably affects most canaliferous Gastropods.

Eupleura caudata Say.

(Plate VI, Fig. 2.)

Ranella caudata Say, Journ. Acad. Nat. Sci. Phil., II, p. 236, 1822.

Eupleura muriciformis Tryon, Man., II, p. 158, *ex parte, non* Broderip.

Eupleura caudata Stimpson, Am. Journ. Conch., I, p. 58, Pl. 8, Fig. 5, 1865; Dall, Bull. 37, U. S. Nat. Mus., p. 120, Pl. 50, Fig. 11, 1889; Trans. Wagner Inst., III, p. 144, 1890.

Eupleura "*clathrata* Gray" Calkins, Proc. Davenport Acad. Sci., 1878, p. 234.

HABITAT: Atlantic coast of the United States from Cape Cod to the Florida Keys, U. S. Fish Commission. Fossil in the Pliocene of South Carolina and Florida and the Postpliocene of most of the Atlantic coast.

The shell sometimes reaches a length of 27 to 30 millimetres.

The specimen figured measures 23.3 long, 12.5 wide, and 8.5 millimetres in lesser sectional diameter, taken from one side of the last whorl to the opposite side at right angles to the plane of the aperture and vertical to the intervarical dorsal node.

This species has been much confused, and the group to which it belongs, though containing but few species, presents as pretty a series of modifications in space and time as any evolutionist could wish to see. Exclusive of *E. pectinata*, of which I have only seen figures, and *Ranella pulchra* Gray, which belongs elsewhere, I recognize among the recent forms one well-established species on the Atlantic coast, with a subspecies or geographical race on the Gulf coast and some of the northern Antilles. On the Pacific coast we have two species, one of which is constant and well marked (the *E. nitida* Broderip), the other very variable and possessing a number of varieties which may be geographical or simply mutations, we are not yet in a position to decide which. *E. muriciformis* Broderip, which is the oldest name for the latter, has been referred to an unfigured "*Ranella clathrata*" of Gray, from the Atlantic, which is not only a more modern name than Broderip's, but the characters given for it are not compatible with the Pacific shell.

Although Say's name was published in 1822, it has been referred to this alleged *E. clathrata* Gray (1839) as a synonym!

The Atlantic form, the typical *caudata*, is found on the Atlantic coast from Cape Cod to the Florida Keys, and it is recognizable when adult by its smaller size, more cancellated sculpture, and by having five transverse riblets on the back of the last whorl between the two varices, and three in front. This is the form figured by Say, and which must retain the specific name. It is also fossil in the Postpliocene, if not also in the Pliocene, of the greater part of the Atlantic coast.

Eupleura caudata, var. *sulcidentata* Dall.

(Plate v, Fig. 4.)

Eupleura caudata, var. *sulcidentata* Dall, Trans. Wagn. Inst., III, p. 147, 1890.

Gulf coasts of the United States and the Florida Keys; Charlotte Harbor, in shallow water among algae, Dall. Coast of Cuba, Gundlach.

The form figured in the Pliocene fossils of South Carolina by Tuomey and Holmes is the typical *caudata*, as is that of the South Carolinian Postpliocene. Calkins's specimens were young and looked much like the young of the Pacific coast species. The Pliocene fossils tend toward an intermediate character, as might be expected. I have seen no genuine *caudata* from the Miocene, though the shell figured by Emons looks as if it was this species.

This variety is characterized by its thinner, more expanded, and recurved varices; its generally whiter color, larger size; and has in the adult, on the back, three intervarical, flattish, transverse ribs and two or three in front. The spire is rather more elevated than in the typical *caudata*, and, except on the varices, the spiral threads are often absent or obsolete. Young shells have more intervarical ribs than adults. In the American Marine Conchology Mr. Tryon, by some oversight, refers to the synonymy of *E. caudata* a *Fusus pyruloides* of De Kay, which appears to have been founded on an immature *Melongena*. It is possible he meant to write *Fusus imbricatus* De Kay, which is described on the same page as the other, and figured on the same plate. This figure somewhat resembles a young *Eupleura*, but from the description one would be disposed rather to refer it to an immature *Urosalpinx*.

This is the southern race of *E. caudata*, readily distinguished from the latter by its usually pure white and less earthy shell, its more sloping spire, less angulated varices, and the sulci between the teeth of the aperture. It has a smoother, less reticulated shell, with the spiral sculpture obsolete, usually few intervarical sharp transverse ridges, and the spines at the shoulder absent or less pronounced. The throat is often purple or brown, against which the white teeth of the outer lip show prettily. It has not been found north of Florida on the Atlantic coast. It frequently reaches a larger size (25 millimetres) than the specimen figured, which measures 19 millimetres long, 10 millimetres wide, and a lesser diameter on the section of the last whorl of 6 millimetres.

This is the form which has, especially in large worn specimens from the Keys, been most frequently mistaken for *E. muriciformis*, the young of which it somewhat resembles.

Nassa californiana Conrad.

Schizopyga californiana Conrad, Proc. Acad. Nat. Sci. Phila., 1856 (Dec.), p. 315; Pacific R. R. Reports, vol. VI, p. 69, Pl. 2, Fig. 1, 1857; Cpr. Suppl. Rep. Br. Assoc., 1853, p. 593.

Nassa (*Caesia*) *fossata* Gabb, Pal. Cal., II, pp. 47, 74, 1839; *ex parte*, not of Gould.

Schizopyga californica Gabb, *op. cit.*, p. 74, in synonymy; not of Conrad.

Miocene of Santa Clara County, California; Conrad. Dead Man's Island, near Long Beach, California; Miss S. P. Monks, Hon. Delos Arnold, and Mrs. M. Burton Williamson. Recent on the coast of California from Drake's Bay to Cerros Island, in 25-65 fms. U. S. Fish Com.

This is a typical *Nassa*, of the evenly reticulate kind, and doubtless the ancestor of *N. fossata* Gould, from which it differs by its more slender and cylindric form, its more evenly reticulate sculpture, and its less pronounced varix at maturity. It has much the sculpture and general form of *N. perpinguis*, with the size and strength of *N. fossata*, with the latter of which it has been injudiciously united by Gabb. The "genus" *Schizopyga* was based on the postsiphonal sulcus common to all species of *Nassa* and described from an imperfect and mutilated specimen. It has of course no claims to present consideration.

Fusus Kobelti Dall.

(Plate VI, Fig. 4.)

Fusus Kobelti Dall, On the California species of *Fusus*, Proc. Cal. Acad. Sci., Mar., 1877. Extra copies Mar. 19, 1877.

HABITAT: Monterey to San Diego, California; off Catalina Island, in 16 fathoms; U. S. Fish Commission.

Shell elegantly and regularly fusiform, of seven or eight whorls, sculptured with revolving lines and transverse costæ. In young specimens the whorls are somewhat rounded, in the adult elongated. Epidermis in perfect specimens dark ashy or greenish olivaceous, rising in crowded lamellæ and obscuring the coloration. This varies, however, with age and habitat. Apex acute, the second and third whorls hardly larger than the embryo. Color whitish, the alternate revolving ridges of a dark brown, which occasionally extends to all the ridges. These ridges do not lose their color in passing over the costæ, except where worn off by rolling on the beach. Except on the earlier whorls the ridges do not show any tendency to enlarge in passing over the costæ. On the posterior edge of the whorls the shell is appressed on the suture, and the ridges here are inconspicuous in most specimens, compared with those on the body of the whorl. These ridges, moreover, bear the character of threads, the interspaces not being channeled, as in *F. Harfordi* and *luteopictus*. In the most perfect specimen, on the

last whorl there are twenty-two brown ridges and as many more intercalary, of the same color as the shell. In melanitic specimens all may be tinged brown. On the antepenultimate whorl between the sutures there are about six main ridges and eight intercalary. The costæ are rounded and prominent only on the earlier whorls, but they remain on the last whorl in a flattened condition, but extend well over the periphery, and are not obsolescent as in the last species. The interior of the aperture is white. Before the lips are thickened the brown lines show through, and the prominent white threads of the throat are distant from the outer edge. In this stage there is no siphonal fasciole. Later both lips may be strongly thickened; the threads (ten or fifteen in number) nearly reach the edge; a labial callus and fasciole are formed. In adults there are about twelve costæ on the last and ten on the sixth whorl.

This species may reach 2 inches in length. A specimen perfect, but with the lip still unthickened, measures 49 millimetres long; spire, 24 millimetres; aperture, 15 millimetres (to posterior notch); canal, 12.5 millimetres. The total is more than the total length, not being measured on a median line.

This beautiful species appears to be very rare in a perfect condition, though rolled specimens are common on Catalina Island (northern) beaches and at San Pedro. The features of a young living specimen from Monterey are obscured by the shaggy epidermis, of which beach specimens show no trace whatever. In much thickened specimens there is a lump on the whorl at the posterior angle of the aperture. It is perfectly distinct from the other Californian species and from any I find figured in the monographs. In a general way it is perhaps a little like *F. ustulatus* Reeve (Conch. Icon., Pl. XVII, Fig. 66). It was named in honor of Dr. W. Kobelt, of Frankfort on the Main, who has prepared a monograph of the genus.

Fusus (*Chrysodomus*?) *Harfordi* Stearns.

(Plate VI, Fig. 6.)

Fusus Harfordi Stearns, Prel. Descr., Aug., 1871, Proc. Cal. Acad. Sci., v, p. 79, 1873;
Dall, Extr. Proc. Cal. Acad. Sci., Mar. 19, 1877.

HABITAT: Mendocino County, California; Harford. Farallones Islands, off San Francisco Bay; Watkins.

Fusus cinnamomeus Rve. (Conch. Ic., 16) presents some resemblance to this species, which differs from the former in having a shorter canal, a longer spire, more rounded whorls and much deeper sutures; more numerous revolving ridges, which are also narrower; and especially in the presence of strongly marked, beautifully rounded costæ, which become obsolete next the suture and on the last whorl. These costæ recall those on the upper whorls in decorticated *Priene oregonensis*, but are not cancellated. They reach across the whorls in the young shell, fading out anteriorly as it approaches the adult condition. In young

shells the epidermis is usually polished and of a bright ruddy brown; in an adult it is raised between the revolving ridges into successive lamellæ, which indicate that a fresh and perfect specimen must present a pubescent appearance, verging on shagginess. The interspaces in the posterior whorls are about as wide as the revolving ridges, but on the last whorl smaller intercalary ridges appear, especially on the anterior half of the whorl. There is a tendency to a smoothish space on each side of the suture, which gives it a channeled appearance. Excluding the nuclear portion, there are about five ridges on the first five whorls. On the fifth there are about ten costæ. On the last whorl of the adult, the costæ being evanescent, there are about seventeen main ridges and ten or eleven intercalary threads. The spire is a little longer than the length of the aperture plus the canal. In the interior of the aperture (which is white), besides the grooves due to the external ridges, there are numerous very fine incised striæ, not quite reaching the margin, and a rather strong groove at the junction of this whorl with the last. There is no siphonal fasciole. Length, 56 millimetres. I have little doubt that this is the shell called by Middendorf *Tritonium Sabini*, from Kenai; at least, there is no other shell of the coast resembling Gray's *Fusus Sabini*. As this species has never been figured, I take this opportunity of illustrating it. The types are in the National Museum collection.

***Fusus corpulentus* Conrad.**

Fusus corpulentus Conrad, Geol. of the U. S. Expl. Exp., p. 728, Pl. 20, Fig. 4, 1849.

Priscofusus corpulentus Conrad, Am. Journ. Conch., 1865, p. 150.

In a nodule of Miocene sandstone from Astoria, Oregon.

The type is still preserved in the national collection, though at one time thought to be lost. Specimens probably of this species have been obtained from the Miocene of Dead Man's Island, near Long Beach, San Pedro, California. The original type is merely an internal cast, and certain identification is impossible. The species is a true *Fusus*, with fine spiral ridges and occasional faint transverse riblets on the upper whorls. It resembles very much the *Fusus Burnsii* Dall, from the Miocene of Petersburg, Virginia, but I regard the two as distinct species. Specimens have been sent for examination from California by Miss Sarah P. Monks and Mrs. M. Burton Williamson, who obtained them from Dead Man's Island. *Fusus geniculus* of Conrad, described at the same time from an imperfect cast, is wholly unidentifiable. There are three species of *Fusus* described from the Santa Barbara Tertiary by Trask in the Proc. Cal. Acad. Sciences, I. p. 42, 1885; of which *F. Barbarensis* and *F. robustus* seem identifiable with living forms from that region, but the subject requires further study.

Trophon triangulatus Carpenter.

(Plate v, Figs. 1, 3, 6.)

Trophon triangulatus Cpr., Suppl. Rep. Brit. Assoc., p. 663, 1863; Proc. Cal. Acad. Sci., III, p. 224, Feb., 1866.

Shell large and strong, having much the texture and general aspect of *Chorus Belcheri*, purplish brown, or nearly the color of *Chrysodomus liratus*; whorls about seven, the nucleus lost; varices six to the whorl, strong, wide, thin edged, with guttered spines, which have their hinder edge rounded; surface with strongly marked lines of growth and half obsolete fine irregular spiral scratches, strongest on the body and almost wholly wanting between the suture and the spines. The interior of the mouth is polished and white or purplish. The specimen under consideration, at a point within the aperture corresponding to the position of the penultimate varix, shows faint indications of short ridges to the number of eight in front of the spine, which look as if that part of the margin of the aperture might in some specimens be denticulate. The specimen measures 75 millimetres long by a maximum diameter (including the spines) of 50 millimetres. The aperture is 56 millimetres long, inclusive of the open canal, and has a maximum width of 18 millimetres. The siphonal fasciole is strong, with a well marked chink next to it.

This remarkable shell recalls *Chorus Belcheri*, from which it differs in the more triangular shape, fewer varices, less rounded body whorl, in the absence of the basal groove and tooth characteristic of *Chorus*, and probably in the structure of the operculum, which has not yet been observed. It is, of course, a considerably smaller shell than *C. Belcheri*. The first specimens were dredged by Dr. Cooper in 90 fathoms, near Catalina Island. The description was drawn up from these, though they were less than half an inch long, and were subsequently generally suspected of being the young of *Chorus Belcheri*. The present specimen, forwarded for determination by Miss Ida Shepard, of Long Beach, California, for the first time enables one to describe the adult characters of the perfect shell and establish its distinctness as a species. It was collected on the sand at Long Beach by Miss L. E. Hale, of Pasadena, and contained the soft parts when found. Miss Hale very generously allowed her "find" to come into the possession of the Museum, where it is registered as No. 120,099.

A second specimen from Long Beach, California, belonging to Mrs. Trowbridge, is younger and somewhat worn. Longitude of shell, 61 millimetres; maximum latitude at spines, 40 millimetres; maximum latitude of body, 27.5 millimetres; longitude of aperture, 44 millimetres; longitude of longest spine, 15 millimetres. This specimen resembles the first in color, texture, etc., but shows an obscure pale band near the suture. It has six spines to each whorl. The apex is defective, but what remains shows the existence of four whorls in the specimen, with possibly one or two more in the nucleus. The interior of the aperture

is livid brown and white, the inner lip in the anterior third of the canal is erect and separate from the siphonal fasciole. It was kindly lent by the owner for inspection.

We are indebted to Mr. J. J. Rivers, curator of the biological collection of the University of California, for the opportunity of examining and figuring the original type specimen of *Trophon triangulatus* in order to complete our account of the species. This young shell differs from the adult in its whitish color, and in having one or two more varices to the whorl. The proportional length, as in all young *Trophons*, between the spire and the last whorl differs somewhat from the adult. The specimen contains the operculum, which is yellowish, subtranslucent, and apically pointed like that of *Chrysodomus*. It measures 11.5 by 6.3 millimetres. The nucleus is small, smooth, and of two whorls. It resembles the young of *T. Gunneri*, but has a shorter and acuter spire and narrower canal. It is represented by figure 3 on plate V.

Trophon cerrosensis, sp. nov.

(Plate v, Figs. 5, 7.)

HABITAT: Off Cerros Island, Lower California, in 12 to 48 fathoms, mud and sand, at Stations 2831 and 2834; U. S. Fish Commission.

Shell of moderate size, thin, elongate, with seven whorls and eight to ten sharp, thin, elevated varices, each produced into a sharp, recurved, guttered spine at the shoulder; color, white to straw color, with blushes of warm brown; transverse sculpture of fine lines of growth; spiral sculpture of low, rounded bands, with narrower interspaces, which faintly crenulate the varices and outer lip; behind the shoulder these are absent; nucleus small, translucent, smooth, and polished, of one and a half whorls; subsequent whorls flattened behind the shoulder, slightly constricted at the base; canal rather long and wide, flexuous, with a marked fasciole; lip thin, pillar with a moderate whitish callus; throat white, without liræ; operculum dark brown, rather rounded. Longitude of shell, 38; maximum latitude, 25; maximum diameter of aperture, 9 millimetres.

This beautiful form most resembles the young of *Chorus Belcheri*, which is much more solid, with fewer varices, and strongly reticulately sculptured. The figure of *T. cerrosensis*, given herewith, is turned so that the aperture is obliquely presented, so as to show the arch of the pillar; if it had been given in full front view the aperture would have seemed more rounded and wider.

This seems to belong to the same group as *T. triangulatus*, but is a much smaller and more delicate species. A marked characteristic is the difference of sculpture between the part of the whorl in front of and that behind the shoulder.

Cancellaria Crawfordiana, sp. nov.

(Plate VI, Fig. 1.)

Shell elongated, slender, with six moderately rounded whorls, reticulately sculptured and covered when fresh with a rather coarse brown fibrous epidermis; whorls transversely sculptured with from fourteen to twenty narrow, clear-cut, moderately elevated, even, slightly flexuous ribs, crossing the whorls, but less prominent anteriorly and separated by wider interspaces. The only other transverse sculpture is of lines of growth; spiral sculpture of (between the sutures nine to ten) narrow, flat topped, strap-like elevated cinguli, with wider excavated interspaces, rather uniformly spread over the whorl, but more distant near the shoulder, and on the earlier whorls somewhat sharper and relatively more prominent. Between the cinguli, and rarely on them, are a few obscure, revolving lines. On the canal the cinguli become rounded, smaller, and obscure. The surface under the dehiscent epidermis is polished pale brown, with a somewhat chalky substratum easily eroded. The upper whorl or two have lost most of this layer in the specimen figured and the nucleus is lost. The suture is deep, but not channeled. The canal has no constriction behind it. The aperture is rather long, the outer lip but slightly reflected and a little fluted by the spiral sculpture. Inside there are a few faint and obscure liræ. The throat is pure white; the thin body callus, tinged with pale pinkish brown. The anterior angle of the aperture is nearly canaliculate, and produces a perceptible siphonal fasciole. The pillar is straight and strong, with two plaits; the posterior stronger, both oblique and rather low. The angular edge of the pillar, though not elevated, might by some be taken as an obscure third plait. At the end of the plaits on the callus of the pillar are a number of small shelly pustules like those on *C. cassidiformis*. Longitude of shell 43; maximum latitude 21 millimetres.

HABITAT: Drake's Bay, near San Francisco, California; dredged alive by Mr. J. S. Arnheim, in 24 fathoms. Also by the U. S. Fish Commission steamer *Albatross* at various points between San Diego and San Francisco, in 20-30 fathoms.

We are again indebted to Mr. J. J. Rivers, of the University of California, for the opportunity of figuring and describing this fine large shell, which forms an interesting addition to the mollusk fauna of Alta California. It belongs to a group of *Cancellarias* rather abundantly represented on the subtropical part of the Californian coast, but of which no species has yet been found in a living state so far north before. This group includes *C. affinis*, *urceolata*, *cassidiformis*, and *obesa*. The present species is nearest to *C. urceolata*, which is smaller with much higher and more horizontal plaits and somewhat different sculpture and proportions. It is possible that *C. urceolata* in northern waters grows larger and presents a modified physiognomy, but the

rarity of specimens of this genus stands greatly in the way of a proper knowledge of the range of their variations. The Arctic forms of this group, *e. g.*, *Admete* and *Cancellaria modesta*, vary greatly, but the tropical forms are less known. As species go this appears to be sufficiently distinct. It is named, at the request of Mr. Rivers, in honor of Mr. A. W. Crawford, of San Francisco, a noted collector of shells, especially of that region. I may add that *C. cassidiformis* Sby. has been collected near Cerros Island, off the coast of Lower California, as well as *C. obesa* Hinds and *C. bullata* Sby. *C. cassidiformis* is also found fossil in the Miocene or Pliocene formation of Santa Barbara County, California. *C. tritonidea* Gabb and *C. vetusta* Gabb, from the Tertiary of California, are based on a young and a very aged specimen, respectively, of this variable species.

Tellina Idæ Dall.

(Plate VI, Fig. 3. Plate VII, Figs. 1, 4.)

Shell ovate-triangular, moderately elongate, white, compressed; exterior of the right valve slightly flatter, and with more prominent sculpture than the left valve; beaks small, pointed, prominent, laterally compressed, adjacent to each other; anterior part of the shell slightly longer than the part posterior to the beaks, evenly and regularly oval, the dorsal and basal curves almost identical; posterior dorsal slope steeper, rectilinear, obliquely truncate at its termination, the basal curve (behind the perpendicular from the beaks) similar to its anterior part as far as the flexure, which is narrow but well marked, its basal end moderately incurved; behind, it rises to a strong ridge the end of which forms a rostral projection, behind which, in the right valve, is a deeply impressed line a little in advance of the posterior dorsal margin, which is strongly compressed; on the left valve there are two lines with a narrow impressed area between them, above which the dorsal margin is swollen; in front of the beaks is a narrow, acute, deeply excavated, short lunule; behind the beaks is a large, narrow, still more excavated escutcheon, most of which is excavated from the left valve, which falls short of the right valve a little; the ligament is sunken in and about half as long as the escutcheon; it is quite invisible on a lateral view of the shell; the left valve is regularly, sharply, closely, concentrically grooved, and both are obsoletely, finely, radiately striate; the margin between the impressed area of the left valve and the escutcheon is more finely grooved than the rest and has a (somewhat irregularly) denticulate dorsal edge; the right valve has the concentric sculpture more distant and, ventrally, shows distinctly elevated narrow lines with wider interspaces regularly disposed, and also bears denticulations on its posterior dorsal margin; the umbones are nearly smooth; the shell gapes but little, chiefly at the end of the rostrum; internally the surface of the valves is smooth, the muscular and pallial impressions are brilliantly polished; besides the usual marks, in the specimen under examination there are, near the

posterior ventral angle of the pallial sinus, two small circular impressions and some obscure and irregular markings at the entrance of the sinus, all due, doubtless, to attachments of the mantle and probably inconstant or variable in different individuals; the anterior part of the pallial sinus nearly reaches the scar of the anterior adductor, and nearly the whole of the basal part is coincident with the line of the basal attachment of the mantle; the hinge plate is broad and subtriangular quite strong, bearing one prominent grooved tooth between two channels; behind the posterior channel, in the left valve, is a much narrower, obscure, and little-raised tooth; the corresponding second tooth in the right valve is anterior and similarly obscure; the left valve is destitute of lateral teeth, but in the right valve there is a short, strong, elevated, subtriangular, anterior lateral close to the anterior cardinal, and a more distant and feeble posterior lateral over the posterior adductor scar. Altitude of shell, 28.5; maximum longitude, 48; diameter, 8.5 millimetres, of which 5.0 millimetres is comprised in the left valve.

HABITAT: Long Beach, San Pedro, California; first collected by Mrs. G. L. Trowbridge, and forwarded for inspection by Miss Ida Shepard; subsequently by Mrs. Burton Williamson, of University, California. Catalina Island, 16-38 fathoms; J. G. Cooper (fragment) and W. H. Dall (young shells). Fossil in the Miocene of San Diego, California.

This fine shell is a typical *Tellina*. It is apparently most nearly related to Deshayes' *T. denticulata* of the Cumingian collection. His description in several points, though insufficient for certain identification, agrees fairly well with this species. *T. denticulata* does not appear to have been figured. The shell, so named by Sowerby in Reeve's *Iconica*, is a *Macoma*, and probably a young specimen of *M. secta*. It does not agree with Deshayes' description, nor with his MS. outline in my possession. The species is not referred to by Bertiu, in his revision of the *Tellinidae* of the Paris Museum, and I have been unable to consult Römer's monograph. There is nothing corresponding to the present shell in Reeve's or Hanley's monograph. The shell referred by Carpenter (Mazatlan Catalogue, p. 38) to Deshayes' species is worn and not capable of being positively identified, while the habitat of Deshayes' type is unknown. Two specimens forwarded by Mrs. Williamson differ quite markedly in height from base to beaks. One, which Mrs. Williamson kindly presented to the Museum, was an almost perfect match for the specimen forwarded by Miss Shepard which is figured herewith; the other was proportionately less elevated.

Mr. Edgar A. Smith, Assistant in the British Museum, in charge of the conchological collections, after comparing the drawings here used to illustrate this species with Deshayes' type in the British Museum, and with their other *Tellinidae*, writes of Deshayes' form: "It is evidently quite distinct from your shell, which I can not identify with anything in our collection." A sketch of Deshayes' shell, kindly made and sent by Mr. Smith, fully confirms his opinion of their distinctness, *T. denticu-*

lata being shorter, more elevated and inflated, with the anterior part of the pallial sinus confluent with the anterior muscular impression. As the *T. denticulata* has never been figured we have thought it useful to reproduce Mr. Smith's drawing, which will be found at figures 2 and 3, Plate VII.

The species is named for Miss Ida Shepard, to whom we owe the opportunity of examining it, one of a group of energetic collectors and students of the local fauna who have recently made important additions to our knowledge of the molluscan fauna of southern California.

Clementia subdiaphana Carpenter.

(Plate VII, Figs. 5, 6.)

Clementia subdiaphana Carpenter, Suppl. Rep. Brit. Assoc., 1863, pp. 602, 607, 640; Proc. Acad. Nat. Sci. Phila., 1865, p. 56.

HABITAT: Vancouver Island, Lord; Puget Sound, Kennerly; Port Etches and southward on the Alaskan coast, 14 to 60 fathoms, Dall; off Drake's Bay, California, near the entrance to San Francisco Bay, dredged by Mr. J. S. Arnheim in 24 fathoms, and lent for examination by Mr. J. J. Rivers, University of California.

The original specimens of this species were young and subdiaphanous. Specimens collected by the writer at Port Etches in 1874 are as large as *Venus mercenaria*, ashy and calcareous, but still relatively very thin. They are usually, especially the young ones, more elongate and *Callista*-like in form than the remarkably rounded specimen which Mr. Rivers has been so kind as to lend us for examination. As this fine shell has not been figured, I have taken advantage of the opportunity of putting its characters on record graphically. Inside it is of a dead chalk-white, with the muscular and pallial impressions polished, and also less obviously the border outside of them. The ligament is black and sunken; there is neither lunule nor escutcheon. The area where the lunule should be is slightly more polished and compressed than the adjacent surface, but has no circumscribing line. The beaks are small and incurved, so that they point away from the hinge line. The exterior is white with some fortuitous rusty spots, sculptured with strong, slightly irregular lines of growth. The surface between the lines has a slight silky luster. The valve figured has a maximum longitude of 62.5, an altitude of 58, and a diameter (excluding the teeth) of 18 millimetres. The pair, of course, would have had just twice that diameter.

The young shell is greenish, subtranslucent white, very thin, and usually more elongated in proportion than the adult here figured; but the forms completely intergrade. The locality whence the specimen was obtained is 600 miles farther south than before reported. On the other hand, Port Etches is about the same distance farther north and west than any locality for the species heretofore made public.

The following memoranda will serve to indicate some of the more remarkable new forms of the northwest coast, dredged by the *Albatross* during the past year or two and of which more detailed descriptions with figures are in preparation.

Terebratella occidentalis Dall var. *obsoleta* nov.

Shell more rounded than the original type with the sharp radiating ribs and sulci obsolete and represented chiefly by the brilliant scarlet lines of color which in the type surmount the ribs. U. S. Steamer *Albatross*, station 2984, in 113 fathoms, off Cerros Island, Lower California.

Buccinum strigillatum, sp. nov.

Shell with seven fully rounded whorls, deep suture, and hirsute epidermis; sculpture of numerous narrow flattened primary ridges with subequal channelled interspaces; aperture not expanded but with a wide deep sinus near the shoulder. Color white; length 42, breadth 27 millimetres. U. S. Steamer *Albatross*, station 3170, off Guadelupe Island, Lower California, in 167 fathoms.

Buccinum taphrium, sp. nov.

Shell thin, slender, with polished brown epidermis, with fine spiral striæ and conspicuous zigzag or spiral malleations; six-whorled, acute; suture deeply channelled; aperture white, with thick reflected lip and continuous thick callus on the concave pillar. Length of shell 40, breadth 18, length of aperture 15 millimetres. U. S. Steamer *Albatross*, station 3330, off Akutan Island, Bering Sea, Alaska, in 351 fathoms.

Mohnia Frielei, sp. nov.

Shell small, solid, six-whorled with short canal; white, covered with a dull green epidermis; upper whorls with numerous fine transverse ribs, last whorl smooth, no spiral sculpture. Length 16, breadth 7.5, aperture and canal 8 millimetres. U. S. Steamer *Albatross*, station 2860, off coast of British Columbia in 876 fathoms.

Strombella Middendorffii, sp. nov.

Closely resembling *S. norvegica*, but sharply, finely, spirally incised all over, and when adult, with a strong red yellow or brown reflected lip. *Tritonium norvegicum* Midd. (non Chemnitz) probably; length 110, breadth 60 millimetres. The sculpture is of sharp, fine grooves, not the obsolete spiral striæ occasionally seen on *S. norvegica*. U. S. Steamer *Albatross*, stations 3216 and 3253, off Unimak Pass, Alaska, in 36-61 fathoms.

Strombella fragilis, sp. nov.

Shell thin, inflated, five whorled, pinkish with a thin dehiscient epidermis, fine wavy spiral striæ, strongly recurved canal and widely reflected outer lip. Spire very short, whorls irregularly ribbed near the shoulder or sometimes having imbrications like a *Trophon* in place of ribs; axis nearly pervious. Length of aperture 70, of shell 100, breadth 63 millimetres. U. S. Steamer *Albatross*, station 3252, off Unimak Island, Bering Sea, in 36 fathoms.

Strombella melonis, sp. nov.

Shell large, very thin, inflated, pinkish or yellow and white, last whorl much the largest, the aperture but little expanded, general form ovate, with numerous short obscure waves near the shoulder; surface faintly striated, with obscure spiral bands on some portions. Length 137, breadth 75 millimetres. U. S. Steamer *Albatross*, station 3227, off coast of Unalashka Island, Bering Sea, in 225 fathoms.

Chrysodomus ithius, sp. nov.

Shell slender, acute with seven rounded whorls, distinct suture, surface sculptured only with lines of growth and of a pale purple brownish tint. Aperture moderate not flaring, canal short. Length 70, of aperture 32, breadth of shell 30 millimetres. U. S. Steamer *Albatross*, station 3202, off the coast of California in 382 fathoms. Extremely perfect young specimens show a few faint spirals occasionally.

Chrysodomus periscelidus, sp. nov.

Like a diminutive *C. spitzbergensis*, white with yellowish epidermis, five strong spirals on upper and ten on last whorl with deep channels between them. Whorls eight, canal short, aperture grooved to correspond with the external spirals; throat white; whorls rounded, spire acute; length of shell 46, of aperture 19, breadth of shell 19 millimetres. U. S. Steamer *Albatross*, station 2842, off coast of Akutan Island, Alaska, in 72 fathoms.

Chrysodomus phœniceus, sp. nov.

Shell resembling a small, delicately sculptured, round-whorled *Chry. liratus*. Whorls seven, upper ones with four or five strong cinguli, later ones with numerous fine intercalary threads between the primaries of which there are about twenty on the last whorl, color purplish brown; sculpture feeble, with a smooth band next the suture; there are no transverse ribs; the epidermis is elevated in thin serrate lamellæ in harmony with the lines of growth. Length of shell 56, breadth 30, length of aperture 30 millimetres. U. S. Steamer *Albatross*, Station 2862, off coast of British Columbia in 238 fathoms.

Chrysodomus eucosmius, sp. nov.

Shell white, solid, strong, seven whorled, with a lamellose epidermis raised in lines with spaces between them along the incremental lines,

the edges of the lamellæ sparsely fringed with projecting points. Upper whorls with a space in front of the suture and three strong sharp carinæ, the first interspace wider than the others; on the last whorl are seven or eight spirals, feebler anteriorly; epidermis yellowish olive, throat and pillar white, canal very short, operculum straight, uniceform. Length of shell 33, of aperture 14, breadth of shell 18 millimetres. U. S. Steamer *Albatross*, stations 3227 and 2919, off coast of Unalashka Island, Bering Sea, in 225 fathoms.

This may prove to be a distinct group from *Chrysodomus* proper.

Chrysodomus (*Sipho*) *hypolispus*, sp. nov.

Shell polished, brown, with rounded whorls sculptured only by a few obsolete spirals and malleations with six or seven whorls, well rounded to a distinct suture and rather acute spire; canal very short and strongly recurved, axis almost pervious; outer lip sinuous, throat white, a well marked callus on the pillar and body. Length of shell 55, of aperture 28, breadth of shell 26 millimetres. U. S. Steamer *Albatross*, station 3254, in Bering Sea, Alaska, in 46 fathoms.

Chrysodomus (*Sipho*) *acosmius*, sp. nov.

Shell elongated, with six or seven whorls covered with a dull greenish epidermis and spirally sulcate with rather distant narrow shallow grooves, eighteen to twenty on the penultimate whorl; suture distinct, whorls flattened, canal very short and recurved; aperture white, without callus, lip hardly reflected. Length of shell 60, of aperture 25, breadth of shell 23 millimetres. U. S. Steamer *Albatross*, station 3329, off Unalashka Island, Bering Sea, in 400 fathoms. Many of the North Pacific shells of this group appear to have very short canals.

Chrysodomus (*Sipho*) *halibrectus*, sp. nov.

Shell much like a miniature of the last, with six whorls which are less flattened, weaker and finer spiral striæ, a longer canal, pink color on the pillar, and more appressed suture; the lip is thickened and a little reflected and there is a thin callus on the body. Length of shell 35, of aperture 17, breadth of shell 13.5 millimetres. U. S. Steamer *Albatross*, station 3330, off coast of Akutan Island, Bering Sea, in 351 fathoms.

Trophon (*Boreotrophon*) *scitulus*, sp. nov.

Shell, thin, small, white, five whorled; closely sculptured with regularly spaced low imbricate lamellæ rising to spines at regular intervals on the spirals; on the upper whorls two, and on the last whorl six spirals, of which at the shoulder the hindmost bears the longest spines and is separated from the suture by a wide space; there are on the last whorl thirteen grooved spines on this spiral; canal long, recurved. Length of shell 17.5, of aperture 11, breadth of shell 8.5 millimetres. U. S. Steamer *Albatross*, station 3227, off coast of Unalashka Island, Bering Sea, in 225 fathoms.

Trophon (Boreotrophon) disparilis, sp. nov.

Shell small, white, thin, elongate, with five whorls, with numerous hardly raised transverse ridges or lamellæ on the sutural side of the last whorl, while the anterior part of the same whorl is sculptured with four spiral, hardly raised ridges, and the transverse sculpture fails or becomes feebler; whorls rounded, suture deep, canal long, curved, aperture rounded, simple; length of shell 15, of aperture and canal 11, breadth of shell 7 millimetres. U. S. steamer *Albatross*, station 3048, off coast near Gray's harbor, Washington, in 52 fathoms.

Puncturella (galeata Gld. var?) major Dall.

Shell resembling *galeata* in general and especially in the interior, but very much larger; radii alternately large and small from the beginning; shell white; anterior slope rectilinear, posterior slope slightly arched and a little longer; internal margin crenulate; animal with a well marked verge, length of shell 57, breadth 42, height 27 millimetres. U. S. Steamer *Albatross*, station 3262, off coast of Akutan Island, Bering Sea, in 43 fathoms.

Solemya Johnsoni, sp. nov.

Shell resembling *S. macrodactyla*, Mabille and Rochebrune, from Orange Harbor, Tierra del Fuego, but larger, longer in proportion, the shorter end more tapering and the opposite end more rounded. Length of shell 115, height 48, diameter 18 millimetres. The cartilage pit is 30 millimetres, behind the shorter end and the greatest length of the digitate epidermis beyond the edge of the shelly valve is 23 millimetres. U. S. steamer *Albatross*, station 3010, off coast of Lower California, in 1,005 fathoms.

Cryptodon bisectus Dall.

Venus bisecta Conrad, Pal. Wilkes Expl. Exped., vol. x, App. 1, p. 724, pl. 17, figs. 10, 10a [Miocene of Astoria.] *Thyatira? bisecta*, Meek, S. I. checklist Mioc. Fos. 1864, *Conchocele bisecta*, Gabb Pal. Cal. II, p. 99, 1869.

Off Port Orchard, Puget Sound, by Prof. O. B. Johnson, of Seattle, Washington, and at station 2855, in 69 fathoms, off south coast of Alaska Peninsula by U. S. Steamer *Albatross*. This is undoubtedly the giant of the genus, some specimens reaching 2 inches in length.

Family **CARDITIDÆ**.**Calyptogena**, gen. nov.

Shell ovate, smooth, without radiating sculpture and covered by a conspicuous epidermis; valves closing hermetically; nonbyssiferous; the pallial line simple, the basal margin flat and entire. Shell without a lunule but with a long excavated escutcheon; the ligament deep-seated but practically external. Hinge, in the right valve with a Λ -shaped socket and a triangular cardinal tooth below it, behind which is a short, feeble, narrow, lateral tooth; in the left valve a Λ -shaped cardinal and

posterior lateral. The teeth become more or less obsolete in old shells. The mantle edge is minutely fringed, the siphonal openings papillose, the foot stout, blunt, ovate cylindrical. The shell is earthy in texture.

Calyptogena pacifica, sp. nov.

Shellequivalve, elongate, ovate, white with a thick greenish epidermis; sculpture of incremental lines; form much like *Petricola carditoides* Conrad, the beaks not prominent, the ligament stout, the esutecheon long, narrow, and deep. Length of adult shell 48, height 27, diameter 18 millimetres. The beaks are 14 millimetres behind the anterior end. U. S. Steamer *Albatross*, station 3077, off Dixon Entrance, Alaska, in 322 fathoms.

Limopsis vaginatus, sp. nov.

Shell large, ovate, with a dense brown hirsute epidermis, under which the valve is polished, radiately and concentrically striated; margin simple, polished, central part of the valves striate radially, the muscular scars bounded inwardly by a radial elevated ridge, most prominent behind the anterior scar. Hinge with ten anterior and five posterior teeth, separated by a gap, beaks little elevated, ligament wide, subtriangular and black; behind the hinge the cardinal margin is deeply folded in, forming when the valves are shut a long, very narrow pit more than one-fourth as deep as the whole width of the shell at right angles to that margin; this pit is also densely hirsute. The outline of the shell margin is thus made reniform. Length of shell with epidermis 34, height at right angles to the hinge line 30, diameter 12 millimetres. Length of pit 16 and depth 5.5 millimetres. U. S. Steamer *Albatross*, station 3330, off coast of Unalashka Island, Bering Sea, in 351 fathoms, and south of Unimak, in 80 fathoms, by W. H. Dall, in 1865.

WASHINGTON, June 6, 1891.

REFERENCES TO PLATES.

PLATE V.

- Fig. 1. *Trophon triangulatus* Carpenter, adult, 75 millimetres; p. 180.
 2. *Eupleura muriciformis* Broderip, typical form, 37.4 millimetres; p. 174.
 3. *Trophon triangulatus* Carpenter, young shell, type specimen, much enlarged, 11.5 millimetres; p. 180.
 4. *Eupleura caudata* Say, var. *sulcidentata* Dall, type specimen, 19 millimetres; p. 176.
 5. *Trophon cerrosensis* Dall, type specimen, 38 millimetres; p. 181.
 6. *Trophon triangulatus* Carpenter, adult, viewed from above, diameter 50 millimetres; p. 180.
 7. *Trophon cerrosensis* Dall, type specimen viewed from above, diameter 25 millimetres; p. 181.

PLATE VI.

- Fig. 1. *Cancellaria Crawfordiana* Dall, adult, 43 millimetres; p. 182.
2. *Eupleura caudata* Say, typical form, 23.3 millimetres; p. 175.
3. *Tellina Idæ* Dall, type specimen, side view, 48 millimetres; p. 183.
4. *Fusus Kobelti* Dall, type specimen, 49 millimetres; p. 177.
5. *Eupleura* (var.?) *unispinosa* Dall, type specimen, 40 millimetres; p. 174.
6. *Chrysodomus Harfordi* Stearns, type specimen, 56 millimetres; the apical whorls are somewhat eroded and the edge of the outer lip defective; p. 178.

PLATE VII.

- Fig. 1. *Tellina Idæ* Dall, type specimen, view of interior, 48 millimetres; p. 183.
2. *Tellina denticulata* Deshayes, from a sketch taken from the type specimen in the British Museum, by Mr. E. A. Smith, vertical view, natural size; p. 185.
3. *Tellina denticulata* Deshayes, from the type specimen; p. 185.
4. *Tellina Idæ* Dall, view from above of type specimen, 48 millimetres; p. 183.
5. *Clementia subdiaphana* Carpenter, view from above of right valve; diameter exclusive of the teeth, 18 millimetres; p. 185.
6. *Clementia subdiaphana* Carpenter, interior of adult right valve, 62 millimetres; p. 185.

NOTE.—As the figures are mostly enlarged, the actual longest diameter of the shell, as seen in the position figured, is mentioned in millimetres.